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August 13, 1955

VOL. 65, NO. 3 PAGES 97-113

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Parachuting Supplies

See Page 105

A SCIENCE SERVICE PUBLICATION

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Because these reports are written for readers with a scientific turn of mind, we should like to discuss in some detail the chemistry of the new *Eastofix Dyes* which we have just announced to the textile industry as a solution for the hitherto insoluble problem of piece-dyeing acetate fabrics to a wash-fastness, light-fastness, and gas-fastness equal or superior to that attained in otherwise less favored fabrics. But we can't just now; commercial considerations impede diffusion of knowledge for its own sweet sake. We must content ourselves to regard you as a consumer and technical thought-leader for other consumers.

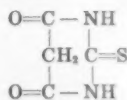
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For Barbara



According to a charming tale, the great von Baeyer named barbituric acid for Barbara, a friend of his. Then someone came along and replaced one of its three ketonic oxygens with sulfur, creating 2-thio-barbituric acid.



Then someone else added 2-thio-barbituric acid to fructose and got a yellow precipitate. Then some medical school people obtained an entirely different orange-red precipitate by reacting 2-thio-barbituric acid with incubated brain tissue and proceeded to prove that the reaction was with a 3-carbon fragment of an oxidized double-bonded fatty acid moiety of the lecithin in the tissue. Then some dairy chemists conceived the idea that this property of 2-thio-barbituric acid might make a convenient test for oxidative deterioration in fats. Then some agricultural chemists worked out the details for using 2-thio-barbituric acid to find out objectively when cheddar cheese has gone bad. Or powdered whole milk or butter. Then we prepared a procedural abstract of their method to give away in order to help us sell our 2-Thio-barbituric Acid (Eastman 660) at \$2.25 for 25 grams.

Want the abstract? The chemical? A copy of *Eastman Organic Chemicals List No. 39* of some 3500 organics we stock? Write to Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company).

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GENERAL SCIENCE

Swap Atomic Information

International Conference on the peaceful uses of atomic energy may open new era in which scientists and industrialists become more important than security officers.

By WATSON and HELEN DAVIS

► A DECADE of the atomic era has been needed to bring the nations of the world together to discuss how the atom can be harnessed for the world's good.

The first combat A-bomb that blasted Hiroshima on Aug. 6, 1945, seems remote in time. The accent at the International Conference on the Peaceful Uses of Atomic Energy in Geneva is on the usefulness of atomic energy, not its destructive dangers.

The big fact of the atoms conference is identical with that of the Big Four conference held in July in the same meeting halls:

Russians and Americans are sitting down and discussing their problems peacefully and constructively. The atoms meeting is much more inclusive, since not just the four top nations, but every nation that is working in the atomic field is participating, under the United Nations.

Few will be surprised to learn from the papers being presented that the Russians and many other nationalities have been able to dig out by the hard research way the facts that the Americans have also discovered and kept rigorously secret until now.

Remember that the Russians made A- and H-bombs by independent research.

For the good of the world, which but for atomic energy might die of slow energy starvation in the coming generations, there should be freedom for announcing all that is known about getting useful power from the atom, using the by-products of atomic energy for scientific exploration, industrial applications and medicine and health.

This will probably result from the discussions. We may be entering a period when scientists and industrialists will be more important than security officers.

Future Energy Needs

► THE WORLD will need eight times as much useful energy in the year 2000 as now, and only by the use of atomic energy can our civilization then meet the constantly increasing demand for energy without seriously depleting our reserves of coal, oil and gas.

In 1975 the need for useful energy will be the equivalent of 27,000 billion kilowatt hours of electricity compared with 10,200 billion kw-h in 1952 and 84,000 billion kw-h in 2000, Dr. Nathaniel B. Guyol, a United Nations expert predicted. More than half of this will be used in industry.

The earth will have a population of 5,000

million people in the year 2000, doubling the present world population. In 1975 it will be 3,500 million.

The world needs a new energy source, Dr. E. A. G. Robinson of Britain's Cambridge University and G. H. Daniel of the British Ministry of Fuel and Power told the conference.

Soviet Atom Knowledge

► THE FIRST detailed description of Russia's first atomic power plant by Soviet scientists at the International Conference on the Peaceful Uses of Atomic Energy brought the verdict that the Russians clearly understand the problems of atomic power development.

They have learned through their own research, as America has learned, the essential information to allow them to build and operate successfully an atomic power reactor.

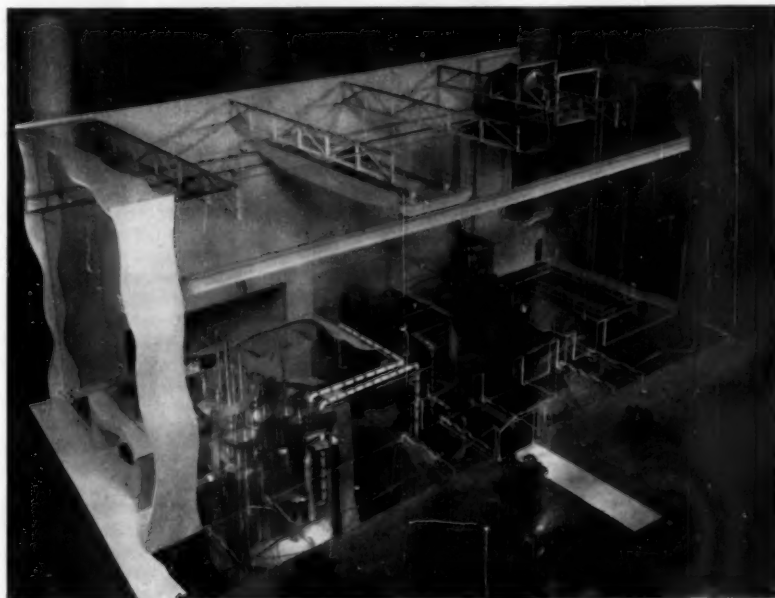
The Russian power reactor with an output of 5,000 kilowatts began generating

electricity at an unrevealed location on June 27, 1954, according to D. I. Blokhintsev and N. A. Nikolayev. Its fuel is enriched uranium containing five percent fissionable uranium isotope 235. Its total charge is 550 kilograms, 1,210 pounds.

The small Soviet power plant is described as the forerunner of a 100,000 kilowatt plant reported as being planned. Speculation is that it may actually be under construction and that, if completed in 1956, it could be the first large atomic power plant, nosing out the British 50,000-100,000 kilowatt plant at Calder Hall and the 60,000-plus kilowatt U. S. plant at Shippingport, Pa., due for completion in 1957.

The present Soviet plant is cooled by water under pressure and the fissioning of the enriched uranium is controlled or moderated by graphite. The heat transfer system consists of two circuits, with one flow of water circulating through the reactor under pressure of 100 atmospheres. Through a system of heat exchangers, the heat is transferred to another circuit of water which, transformed into steam, drives a turbogenerator.

Large power reactors building in the United States do not use exactly this scheme, but some of the reactors at the Hanford, Wash., plutonium plant do use water for cooling and graphite for moderating.



URANIUM TO ELECTRIC POWER—Shown in model form is the Experimental Breeder Reactor II, built to produce electric power. Designed by Argonne National Laboratory, the reactor uses enriched uranium as fuel. Heat is carried by liquid metal to the steam generator (center). The steam produces electric power in the turbo generator at right.

The Soviet scientists discovered, as Americans have, that neutron radiation and heat warp and change the form of the uranium and graphite used in the reactor, requiring them to be especially processed.

While the cost of electricity from the first Soviet atomic power station "exceeds considerably the average cost of electricity from powerful heat power stations in the USSR, "the Soviet prediction is that larger plants now being designed, from 10 to 20 kopeks per kilowatt hour, will produce in a cost range from that of present coal plant electricity to double that value.

The Russians are working on other types of power reactors, including those with liquid metal cooling, plants that use water for both cooling and moderating, a reactor that uses heavy water to absorb the neutrons, homogeneous reactors in which the fuel mingles with the moderator, and fast neutron reactors.

International Radiation

► **INTERNATIONAL AGREEMENT** on minimum standards of the amount of radiation that can be tolerated safely by the human body was called for by Dr. W. Binks of the British Ministry of Health and Medical Research Council's Radiological Protection Service.

A race among nations in developing nuclear power reactors and in attempting to capture world atomic markets is foreseen by Dr. Binks.

It is not "impossible," he said, that in such a race "competitive considerations will lead to drastic economies" of radiation protection.

Soviet Reactor Accident

► **TWO CASES** of acute radiation sickness due to gamma and neutron rays from an experimental nuclear reactor were reported by Drs. A. K. Guskova and G. D. Baisogolov. The victims had violated the rules for operating the reactor. One received 300 roentgens and the other 450 roentgens of radiation.

Doses of 400 to 600 roentgens are considered lethal or near-lethal.

The two victims recovered. Whether other fatal or non-fatal cases in personnel working with nuclear reactors have occurred in the Soviet Union was not stated.

The patients were able to return to work after three months and were still well a year and one-half later.

In treating the patients, a "complex of conventional drugs and methods was used," the Soviet scientists reported, including antibiotics, drugs to check hemorrhage, and drugs to stimulate blood formation.

The patients were taken to hospitals immediately after the accidents and kept in bed with a "sparing diet" rich in proteins and vitamins. At one stage the high calorie diet included raw eggs, milk, curds, meat, lemons and oranges.

As the patients' condition got worse, the "mortal danger" lay in hemorrhages and

infectious complications. To fight this, especial attention was given to treating the oral cavity with antibiotic solutions such as gramicidin, furacillin and penicillin, and to hygienic care of the skin.

In order to react on the bacteria in the intestinal tract, acidophilous sour milk was given in amounts up to one or one and one-half quarts daily.

Blood transfusions were given in doses of about seven ounces by the continuous drip method. The patient who had had the biggest radiation dose, however, had severe post transfusion reactions, so before subsequent transfusions he was given pantopon (an opiate) and atropine.

As soon as the bone marrow showed signs of regeneration, more active stimulation of blood formation was undertaken by giving the following medicines: sodium-nucleinate, thesan, pentoxyl and campolon. Campolon is a crude liver extract. Sodium nucleinate is a salt of nucleic acid from yeast cell nuclei used to stimulate white blood cell production. Pentoxyl has been reported in a Russian ear, nose and throat medical journal as treatment for agnathic angina in which there is marked reduction in the number of white blood cells.

The Soviet scientists state that there are four stages of acute radiation sickness:

1. A period of primary general reaction lasting up to three days and characterized by the patients' poor general condition, derangement of functions of the digestive system and heart and blood vessels and blood changes.

2. A latent period when the patient seems to be in good health.

3. A period of marked sickness.

4. A period of recovery.

Changes in the nervous system's functioning are stressed by the Soviet scientists.

Western scientists may see in this emphasis on nervous functioning the continued influence on Soviet medical science of Pavlov, the Russian physiologist famous for his conditioned reflex theory.

Damage to the blood-forming organs, they believe, is due not only to the direct destructive effect on them of ionizing radiation but is caused also by a disturbance of nerve influences. Studies of other Soviet scientists supporting this are cited.

Changes in brain wave records and in reaction to stimulants such as caffeine were observed at different stages in the radiation sickness.

The Soviet scientists, like their Western colleagues, do not consider the treatment they gave specific as a cure for acute radiation injuries but, like Western scientists, they stress the importance of giving antibiotics and anti-bleeding medicines early to prevent or relieve the worst features of the illness.

Atom's Heart Larger

► **THE ATOM'S HEART**, the nucleus in which almost all the mass of matter is located, may be somewhat larger than previously thought.

Dr. Victor F. Weisskopf of Massachu-

setts Institute of Technology announced theoretical computations that indicate a change in scientists' ideas of the atomic citadel's size.

Radius of the nucleus, he said, is approximately 1.4 times ten to the minus 13 centimeters. This is scientific shorthand for saying it is one five-hundred-million-millionths of an inch.

This seems large, Dr. Weisskopf explained, because it is a measure of the range of nuclear forces.

Science News Letter, August 13, 1955

SCIENCE NEWS LETTER

VOL. 68 AUGUST 13, 1955 NO. 7

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N.W., Washington 6, D. C., MORRIS 7-2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

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Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40, P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283), authorized February 28, 1950. Established in mimeographed form March 19, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 1 E. 54th St., New York 22, Eldorado 5-5565, and 435 N. Michigan Ave., Chicago 11, Superior 7-6048.

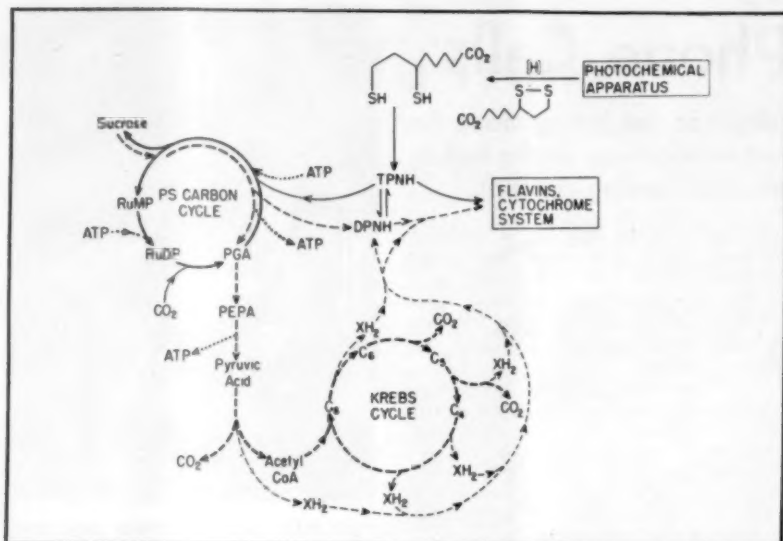
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PHOTOSYNTHESIS CYCLE—The relationship between the photosynthetic cycle, the Krebs cycle and the reducing agents available in the cell is shown in this diagram of Dr. Melvin Calvin of the University of California, Berkeley.

BIOCHEMISTRY

How Green Leaf Works

► THE GREAT RACE among scientists to be the first to give the most complete account of photosynthesis, the food-manufacturing process of the green leaf, comes closer to a finish.

Dr. Melvin Calvin of the University of California, Berkeley, told the National Organic Chemistry Symposium of the American Chemical Society at Purdue University, Lafayette, Ind., how light acts as a valve to control the relationship between two kinds of chemical cycles in plants.

Both cycles are fundamental in maintaining this planet's life.

One is the cycle of sugars. It forms the food that supports life. By alternately building up and tearing down sugars with five and seven carbon atoms, plants add one carbon atom at a time, stepwise, to the structure of the leaves, stems and roots they build in the sunshine. Thus they manufacture food. This fundamental way in which plant tissues are built up has been understood only about a year.

The other life cycle, now linked to the sugar transformations, is known by the name of its discoverer, Dr. Hans A. Krebs of England's Sheffield University. He was honored for discovery of the "Krebs cycle" by the Nobel prize in 1953. In this cycle, citric acid is recognized as a fundamental chemical in many life processes. This is the same substance that is found in lemons and other citrus fruit. It plays a part in sugar utilization by muscles.

Working with radioactive carbon and phosphorus, Dr. Calvin and his research

group have now found that citric acid, a tricarboxylic acid, appears in photosynthetic products as soon as the light is turned off.

Citric acid goes through a complicated but fairly well understood series of chemical transformations in which the elements phosphorus and sulfur take part.

Sulfur is a close chemical relative of oxygen, the vital element breathed by both animals and plants. These two elements can often change places in molecules without a very noticeable change in properties of similar compounds.

Dr. Calvin now suggests that sulfur may be the undiscovered trigger that kicks off the circling reactions that make photosynthesis a continual process in the green plant.

Delicate balance between two alternate kinds of sulfur compounds associated with the sugar and the tricarboxylic acid cycles in living plants may be affected by the sunlight's energy. Light may therefore act as the valve allowing carbon to progress along one pathway while it is shining, shifting it to another in the dark.

Identity of the substance that seizes hydrogen is the final mystery in the photosynthesis puzzle.

Plants take three steps to build complex organic compounds from water and carbon dioxide with light's aid. As each step has been understood by scientists, it has been found more roundabout than early chemists had imagined. Yet the mechanisms found working in green leaves have proved simple.

The first step taken by the plant's chem-

ical factory is to split water into its two elements, oxygen and hydrogen. The oxygen is given back into the air.

In the second step hydrogen helps break up carbon dioxide, changing the carbon to a compound more adaptable to the rapidly changing cycle of organic compounds that the plant continually builds up and breaks down.

In the third step, the beginning of the shifting cycles of organic compounds, the leaf calls upon the phosphorus supply in its tissues to form transitory substances that start the cycles going.

Early Stages Known

The early stages of photosynthesis have been quite thoroughly worked out. Radioactive carbon and phosphorus isotopes have been introduced into plant tissues. The tell-tale atoms show what becomes of these elements. The sequence of compounds formed has been learned by shortening the time between injection of the isotopes and analysis of the radioactive products made by the plant. But the very earliest substance made, the compound that triggers the first attack on the carbon, has remained a mystery.

Hydrogen is the part of the broken-up water molecule that the plant holds. No bubble of hydrogen gas as such is ever let loose by the green leaf. The plant's chemical factory takes the hydrogen ion, with its electrical combining charge, and combines something with it to form an unstable compound. This compound turns into one kind of substance in the dark and another kind when light shines on the leaf.

The energy the plant uses for these transformations has been measured. To make the chemical change from one molecule of carbon dioxide, such as the plant would absorb from the atmosphere, to a readily reacting form of organic compound usable in the plant's tissues, the plant will ultimately call into use four electrons, obtained from splitting water, plus three molecules of a compound chemists call ATP. The letters are an abbreviation of the compound's long name, adenosine triphosphate.

Since the importance of phosphorus compounds has been recognized, this substance has been known to take an important part in photosynthetic reactions. If the trigger chemical proves to be a known sulfur compound, scientists will know how the mysterious green leaf goes about its work.

When this great advance is achieved, it may lead to the chemist's imitating the green leaf and setting up a factory to manufacture sugars, carbohydrates and other foods, beating the plants at their own game.

It is also likely that other complex chemical cycles will be discovered in living plants. As is so frequently the case in scientific advances, the puzzling out of one kind of complexity leads to still others. Probably other cycles besides the sugar cycle and the Krebs cycle will be found, operating to produce the great variety of substances manufactured by living matter.

ENGINEERING

Split Second Phone Calls

Speedy coder sends out digits so fast it may make the telephone dial obsolete. The electronic device, in the testing stage, is based on a new mathematical coding concept.

► A NEW SIGNALING system for telephone dialing—so fast that it may do away with the dial itself—has been developed by Bell Telephone Laboratories in New York.

The device, called a polytonic coder, sends out digits just about as fast as they can theoretically be packed into a line. A test model can send 100 digits a second reliably over almost all telephone connections.

To use such speed, the present dialing system might be replaced, perhaps by a push-button system.

With the new phone, you would punch out your party's number on buttons on the phone's base while the receiver is still on the hook. When you pick up the receiver, your party's phone will start ringing. If the line is busy, you need not dial again. The button setting will remain until you change it. All you need do is pick up the phone again.

Present dials are too slow for the new signaler. It takes up to 12 seconds to dial a seven-digit phone number—almost all wasted time—besides a delay while the connection is made.

Results of laboratory tests with the signaling system were so encouraging, Dr. C. A. Lovell, J. H. McGuigan and O. J. Mur-

phy report in the *Bell System Technical Journal* (July), that arrangements were made to try it on New York circuits.

The tests showed the polytonic signal could be used on all except a few telephone connections in this country, Dr. Lovell told SCIENCE SERVICE.

Need for a signaling system in the future significantly faster than today's dial spurred the development. The term "polytonic" was coined because the system uses five separate frequencies. Each digit is represented by a different two-tone combination. The device is based on a new mathematical concept of electronic coding.

Today's dial system depends on timing. The time it takes for the wheel to come to rest determines the digit sent over the lines to the central connecting office. If you get impatient and try to force the dial around faster than it would go naturally, you might get a wrong number.

There would be no impatient dialers if the new system is adopted. It can transmit digits many times faster than any human can send them. To make efficient use of the device's speed, the telephone number would have to be set up first on the phone and sent out after the setting has been completed.

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ENTOMOLOGY

See Victory Over Budworm

► INSECT FIGHTERS are scoring a whopping victory over one of the nation's major insect pests, the spruce budworm.

Some 4,000,000 acres of rich spruce-fir timberland have been almost totally cleared of the destructive spruce budworm since mass spraying of infested forests with DDT was begun in 1949, Everett Clocker of the U.S. Forest Service's timber management division said.

In the closing weeks of July, the Forest Service sprayed 2,250,000 acres of spruce-fir forest in Oregon, Idaho, Montana and New Mexico, where there had been a tremendous build-up of the budworm. If the mass spraying hits the spruce budworm this year as it has up to now, this great area should be almost completely cleared of the pest.

The Forest Service calculates that there are some 12.3 billion board feet of timber, valued at \$38,000,000, in this year's sprayed area. Cost of the aerial spraying averages little more than one dollar an acre.

The spraying must be carried out during the few days, usually in July, when the

budworm larvae are exposed while feeding on the needles of fir trees. One pound of DDT in fuel oil per acre is sprayed over the forest from low-flying planes. This dosage is enough to kill the budworms without causing significant harm to wildlife.

Before the mass spraying technique was perfected, timbermen had almost no means of fighting the budworm, which could put them out of business during years of serious outbreaks. During the 1919-20 season, budworms destroyed a volume of wood in Canada said to equal a 40-year supply for all the pulp mills then operating there.

That same season, the budworm killed 70% to 90% of the mature fir stands in Minnesota and Maine.

For next year's spraying, plans center about a badly infested area of Montana, in a location the Forest Service could not work this July, even though budworm infestation has been very serious there this year.

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FORAGE CROPS—From first cross hybrids of sorghum-Johnson grass, such as this, new forage plants have been developed that combine the valuable feed carbohydrates of sorghum and the perennial habit of Johnson grass.

AGRICULTURE

Cows Choose Their Favorite Forage

► SINCE THE customer is always right, scientists are letting cows decide which hybrid forage plants are best in experiments to cross carbohydrate-rich sorghum with perennially growing Johnson grass.

Palatability of each of hundreds of sorghum-Johnson grass crosses has been tested by letting cows feed on them. The animals chose to dine on those with juicy, succulent stalks.

From work done jointly by the U. S. Department of Agriculture and the Mississippi Agricultural Experiment Station, sorghum-Johnson grass crosses have been made that yield over 30 tons of forage an acre. If field tests this year confirm expectations, seed supplies of the best crosses may be built up for release to growers.

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TECHNOLOGY

Solution to Toll Takers' Frozen Fingertips Found

► A SOLUTION to the greatest occupational gripe of toll takers—frozen fingertips in winter months—has been found.

In colonial days, toll collectors on the old turnpikes used foot warmers containing hot coals. Now an electric hand-warmer has been developed for toll takers by the Delaware River Port Authority. Twenty have already been installed in collection booths of the Philadelphia-Camden Bridge.

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DENDROLOGY

Hurricane-Safe Trees

► THE HURRICANE SEASON is here and trees, as well as people, are in danger.

Tremendous losses were suffered by homeowners in last year's storms as thousands of valuable shade trees were hurled to the ground by the great winds, littering streets and lawns and in many cases crashing into homes and cars.

To lessen the chance of this happening in 1955, here are some tips on how to prepare shade trees for the hurricane threat:

1. Remove all doubtful trees now, before a hurricane does it for you. This may prevent damage to surrounding trees, to your lawn and perhaps to your house.

2. Put stout cabling on long limbs that might snap under stress of hurricane-force winds, or on weak or defective limbs that you do not want to remove outright.

3. Bind together the limbs of large crotches with a hefty brace. In hurricane winds, the branches of a crotch are often blown in opposite directions, splitting the tree down the middle. A good brace may easily prevent this.

4. Prune trees with too dense crowns, or whose limbs hang dangerously over houses, drives and walks. Shade trees with thick tops should be given a "hair cut," to thin out branches so the wind can pass through

instead of bowling them over.

5. Do these things now, or you may not have shade trees when the hurricanes hit next year.

If your trees ride out this season's hurricanes safely, there are two things you can best do next year to insure against later storm damage:

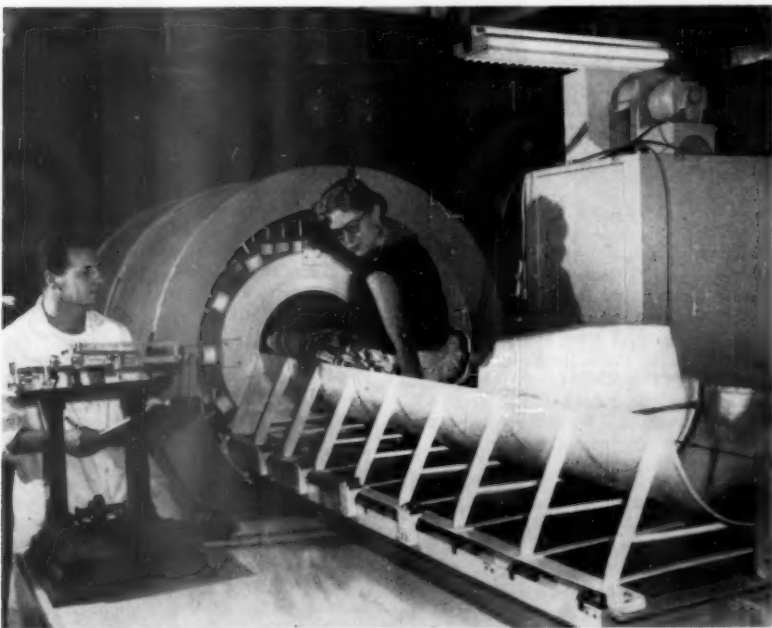
Do necessary pruning before the spring growing season starts. Trees pruned in spring heal better and faster. The growing strength of the trees is redirected from the weak to the strong branches. This makes the trees just that much stouter against storm winds.

Give your trees good general care, watering them well and feeding them with nutrients to promote deep root growth and sound wood.

If a shade tree is blown over, can it be set back up and survive? There is no hard and fast answer.

In general, trees with a trunk no stouter than an arm have a chance to pull through. Larger trees usually have their roots damaged when they overturn and, even though they may last through the year, their weakened root system makes them easy prey for the next year's storm winds.

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YOU RADIATE—This girl is truly radiant. Like all living things she contains radioactive substances. The machine, exhibited at Los Alamos Scientific Laboratory's "Open House," was developed there especially for counting the radiation of human bodies. Robert L. Schuch is preparing to "read" Mrs. Julie Wellnitz.

• RADIO

Saturday, August 20, 1955, 5:00-5:15 p.m. EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Report from the International Conference on the Peaceful Uses of Atomic Energy in Geneva.

CHEMISTRY

New Technique Detects Small Amounts of Metal

► HOW TO extract a very small amount of metal from a very dilute solution, for example the iron, zinc and manganese from a half-cup of maple syrup in a quart of water, has been found by two scientists at General Electric Research Laboratory, Schenectady, N.Y.

By using ion exchange resins similar to those in water softening apparatus but made into the form of a thin film, Drs. W. T. Grubb and P. D. Zemany located by X-ray spectrography of the resin's surface all the minute amount of metal compounds they had injected into a test solution. The solution had been stirred for several hours in a dish containing the thin resin film.

Metal from the test solution adhered to the film, where it was identified and measured using the X-ray method. The new method extends this kind of X-ray examination "into new areas beyond the range of previous methods," the scientists report in *Nature* (July 30).

Science News Letter, August 13, 1955

CHEMISTRY

Insight Into Fats From Synthesis of Old Drug

► SYNTHESIS of chaulmoogric acid, formerly the most common drug used for treatment of Hansen's disease (leprosy), is announced by Drs. Kurt Mislow and I. V. Steinberg of New York University in the *Journal of the American Chemical Society* (July 20).

Chief importance of the synthesis, Dr. Mislow points out, is the insight it gives into the molecular structure of fats.

Chaulmoogric acid has been replaced in leprosy treatment by synthetic drugs of the sulfone family. It is derived from the oil from seeds of a tropical Asian tree.

Of all seed fat acids chaulmoogric is unique in having a ring-like, unsymmetrical structure. Its two forms (stereoisomers) are the same when represented in a projection formula, but different, structurally, in space. Like hands, one is the mirror image of the other, but the two are different when viewed in three dimensions.

Only one of these forms, the "right handed," occurs in nature. Dr. Mislow reported that, besides synthesizing the natural form, the researchers determined its spatial arrangement and thus, automatically, that of the mirror image.

Science News Letter, August 13, 1955

BIOCHEMISTRY

Synthesize Part of Large Vitamin Fragment

► PART of the biggest piece of anti-anemia vitamin B-12 has been synthesized by scientists of Merck and Co., Inc., Rahway, N.J. The synthesis is considered a key both to the vitamin's structure and to its complete synthesis, as well as to more knowledge of how the vitamin acts in the body.

The vitamin, made up of 183 atoms of six different kinds, is produced by fermentation methods similar to those used for production of penicillin and other antibiotics.

The synthesis, by Drs. Karl Folkers, Frederick A. Kuehl and Clifford H. Shunk, was announced by Dr. Folkers at the International Congress of Biochemistry, Brussels, Belgium.

Science News Letter, August 13, 1955

PUBLIC HEALTH

Nearly Eight Million Get Polio Vaccine Safely

► ADDITIONAL ASSURANCES that "accidents" with polio vaccine are the exception, not the rule, comes from the fact that nearly eight million children have now received the vaccine without harmful effect, in the opinion of Dr. Thomas Francis Jr., director of the Poliomyelitis Vaccine Evaluation Center at the University of Michigan.

The eight million includes children vaccinated in Canada and Denmark as well as the United States.

Contrary to some authorities, Dr. Francis thinks that polio has not been overemphasized as a disease problem.

"The fact that other diseases are more prevalent or more severe only indicates that they too need adequate investigation looking toward control," Dr. Francis said.

Science News Letter, August 13, 1955

ASTRONOMY

Three Asteroids Are Named by Discoverers

► THREE ASTEROIDS, or minor planets, have now been named by their discoverers, Cincinnati Observatory has reported.

Following international custom, the astronomers who first spotted these celestial fragments picked the asteroids' names.

The minor planet 1942 AA will be known as Wingolfia, in honor of a Heidelberg student fraternity, banned during Hitler's time, which celebrated its 104th anniversary June 17. K. Reinmuth of Konigstuhl Observatory, Heidelberg, Germany, chose the name.

Dr. L. Boyer of the Algerian Observatory, Algiers, discovered two asteroids five years ago. The one formerly known as 1950 CA will now be called Paloque after E. Paloque, director of the Observatory of Toulouse, France. The minor planet 1950

WA will henceforth be known as Giomus, so named in honor of the birthplace of P. Pretre. It is the sixth-century name of the present town of Gien (Loiret), which suffered terribly during the Nazi occupation of 1940.

Minor planets are believed to be remnants of an exploded planet that once traveled in an orbit between Mars and Jupiter. Stellar in appearance, they have no light of their own, shining only by reflected sunlight.

Science News Letter, August 13, 1955

RADIO ASTRONOMY

Strong Radio "Star" Found in Milky Way

► DISCOVERY of a new, strong radio "star" in the Milky Way galaxy is reported by Drs. H. C. Ko and J. D. Kraus of Ohio State University, Columbus, Ohio, in *Nature* (July 30).

Radio "stars" send out energy as do visible stars, but in the form of radio waves, not light. Very sensitive receivers known as radio telescopes pick up this cosmic static.

When Drs. Ko and Kraus aimed their receiver toward the constellation of Monoceros, the unicorn, they found a radio source at a position agreeing closely with that of the Rosette nebula.

Their discovery was made during a survey of that part of the sky in a direction opposite from the galaxy's center. Eighteen other intense radio sources were also detected in that region, according to the scientists' report.

Science News Letter, August 13, 1955

METEOROLOGY

Hot August Forecast for Northern Part of Nation

► A HOT AUGUST for almost all the northern two-thirds of the nation, with temperatures averaging above seasonal normals, has been predicted by the Weather Bureau's long-range forecasters.

Thermometer readings will register especially higher than average in the Central and Northern Plains regions, they forecast. Only exceptions to above average temperatures in the North will be in the Pacific Northwest and in northern New England, where near normal temperatures are expected during August.

Below normal temperatures are predicted for the Gulf states and the Southeast. Unspecified areas are expected to average near normal in August.

Precipitation is forecast to exceed normal along the Gulf Coast and over the southeastern quarter of the nation, as well as in the western inter-mountain region and the Pacific Northwest.

Subnormal amounts of rain are anticipated over the Central and Northern Plains, the Great Lakes region and the Northeast.

Science News Letter, August 13, 1955

IN SCIENCE

MEDICINE

Ultrasound Relieves Phantom Limb Pain

► PHANTOM LIMB PAINS, a troublesome affliction in amputation cases, and pains in amputation stumps can be relieved in many cases by ultrasound treatment, Veterans Administration doctors have reported.

Rheumatic diseases and some painful muscle and nerve conditions are also helped by treatment with high frequency sound waves that cannot be heard by human ears.

Equipment for ultrasound treatments has now been installed in nine hospitals and one regional center, and will be installed in other VA facilities as soon as qualified personnel are trained for its use, the VA has announced.

The treatment is not considered a cure-all and patients are carefully selected to make sure they will benefit by it.

Science News Letter, August 13, 1955

CYTOLOGY

"Leaky" Cells May Cause Muscular Dystrophy

► MUSCULAR DYSTROPHY and other primary muscle diseases may be caused by "leaky" cells with inherent defects that permit potassium to drain out.

This was suggested by doctors at the University of California at Los Angeles Medical Center and the Los Angeles Veterans Administration Center.

Measurements were made of cellular potassium in patients with muscular dystrophy and certain other muscle disorders, and among members of the patients' families. Potassium level was found to be low in all patients and among several apparently healthy children of muscular dystrophy patients.

Patients with childhood muscular dystrophy had particularly low potassium content. There was also some correlation between potassium level and degree of physical disability.

The study indicated that a critical level of body potassium may exist, below which normal muscle function cannot be maintained, resulting ultimately in muscular atrophy and degeneration. The low potassium content of some healthy children of muscular dystrophy patients suggested that an inherent cellular defect might be responsible for this condition.

The study, reported in *Neurology*, was performed by Drs. William Blahd, Franz Bauer, Raymond Libby and Augustus Rose under a grant from the Muscular Dystrophy Associations of America, Inc.

Science News Letter, August 13, 1955

IE FIELDS

MEDICINE

Drug Restores Deranged Brain Waves to Normal

► A DRUG that shows promise in clearing hallucinations, delusions and other symptoms in some mentally sick persons now is found to restore deranged brain waves to normal.

The drug is a pipradol chemical trademarked Frenquel by the manufacturer, the Wm. S. Merrell Co. of Cincinnati.

Its effect on abnormal brain waves is announced by Dr. Franco Rinaldi of the University of Cagliari, Cagliari, Italy, and Dr. Harold E. Himwich of the Galesburg State Research Hospital, Galesburg, Ill.

In patients with the mental sickness schizophrenia, and in a drug-induced mental condition that mimics schizophrenia, brain wave patterns are similar but both differ from normal. They show a change of the brain's electric activity, with choppy rhythm and low-voltage fast activity.

In rabbits, these brain wave changes were brought on by LSD-25, lysergic acid diethylamide, the drug that causes schizophrenia-like hallucinations in normal persons.

Within two to ten minutes after giving Frenquel, however, the normal pattern of brain electric activity was restored.

The effect of Frenquel is apparently specific for changes caused by LSD-25 in the rabbit brain waves. The findings give further evidence that the action of Frenquel is restricted to the brain and central nervous system and does not affect the autonomic nervous system.

Science News Letter, August 13, 1955

AERONAUTICS

Plane Can Land on Any Surface With New Gear

► A SKI-WHEEL landing gear, known as a retractable hydro-lift, now makes every beach in the world a potential airfield for long-range bombers, as well as jet fighters.

A small businessman's aircraft, the first airplane to be equipped with the landing gear, has flown successfully, its designers, the All American Engineering Company, reported in Wilmington, Del. Capable of being tailored to fit any airplane, the hydro-lift permits land-based planes to operate from water, snow, mud, ice and runways.

Using the same principle as water-skiing sportsmen do, the hydro-lift gear resembles a pair of short wide skis with wheels protruding from the center. On land, the gear operates as on a conventional wheeled plane. On water, the retractable skis allow a pilot to skim the water at 15 miles per hour or more until he taxis it onto a beach

or wooden ramp.

On take-offs, the procedure is reversed. The pilot starts from the beach to pick up speed before turning into the water for take-off.

In mud or snow, the hydro-lift airplane uses skis to prevent sinking and for take-offs.

The hydro-lift's developers see many military and civilian applications for retractable ski-wheel landing gear. They pointed out that bombers equipped with the gear could be strung out along beaches, eliminating crowded and "vulnerable" airfields.

Jets could be water borne, and for island-hopping operations could be landed right on the beachhead. Cargo aircraft could act as landing ships for a beachhead operation.

Commercial airliners equipped with the gear, they said, can get closer to the center of cities located near water. Private pilots near lakes or rivers can have private airports.

Science News Letter, August 13, 1955

VETERINARY MEDICINE

Animals Looking Rabid May Have Distemper

► WILD ANIMALS showing rabies symptoms—aggressive behavior, convulsions, frothing at the mouth, lack of fear of man—may really be suffering from canine distemper, two University of Connecticut scientists have discovered.

Examining 35 foxes, skunks and raccoons, displaying rabies symptoms, Drs. C. F. Helmboldt and E. L. Jungherr found no rabies cases among them, but they did discover canine distemper in 20 of the animals.

Laboratory tests on the remaining 15 animals for distemper were not conclusive, but the scientists believe that some of these suffered from canine distemper too.

In wild animals of relatively rabies-free areas, the disease should not be diagnosed from symptoms alone but requires complete laboratory testing, they concluded.

Their findings are reported in the *American Journal of Veterinary Research* (July).

Science News Letter, August 13, 1955

TECHNOLOGY

Air-Filled Cushions Soften Equipment Drops

See Front Cover

► FOUR PARACHUTES and six Aero-Pallet cushions take the shock out of drops of heavy military equipment during tests at the Naval Air Auxiliary Air Station, El Centro, Calif.

The barrel-shaped cushions, developed and built by Firestone Tire & Rubber Company, fill with air while falling from a cargo plane, as shown on the cover of this week's SCIENCE NEWS LETTER. After cushioning the shock of landing, they collapse. They reduce ground impact in parachute drops of weapons, jeeps, bulldozers and other equipment.

Science News Letter, August 13, 1955

CHEMISTRY

Debasement of Coinage Practiced in 50 B.C.

► DEBASING CURRENCY is not just a modern economic expedient.

Chemical evidence has revealed that silver money was debased some 2,000 years ago by cutting down the silver content in the ancient kingdom of Parthia's money.

Parthia became an independent kingdom about 250 B.C. and, despite Roman attacks, remained so for nearly 500 years. Its area covered most of what is now Iran.

Under King Orodes I, silver content of the Parthian coin, the drachm, dropped as low as 40%, well below that of coins struck off before and after his reign. All U.S. silver coins from a dime to a dollar contain 90% silver.

Chemical analysis of the ancient coins was made by Dr. Earle R. Caley of Ohio State University and Prof. Charles D. Oviatt of Tarkio College, Mo. They reported their findings in a monograph to the American Numismatic Society.

"Extraordinary circumstances" may have accounted for this severe debasement of the Parthian coinage, Dr. Caley said. Such circumstances may have included the internal struggle for power between Orodes and his brother, Mithradates III, military clashes with the Roman Empire, and the Parthian invasion of Syria in 51-50 B.C.

"Between 57 and 50 B.C.," Dr. Caley said, "it may well have been that the available supply of pure silver simply could not keep pace with the increased demand for coins. . . . Since there was no reduction of the weight standard for the drachm, the only way by which the demand could then be met would be by the debasement of the coinage silver."

Science News Letter, August 13, 1955

MEDICINE

Cancer Greater Risk To Men Than to Women

► THE RISK of developing cancer is 60% greater for men than for women, if cancer of the reproductive organs and breast cancer are excluded, surveys by the National Cancer Institute, Bethesda, Md., show.

"This greater risk is related, in part, to the survey findings that cancer of the lung and bronchus occurs more than five times as frequently, and laryngeal cancer 12 times as frequently in men as in women," Dr. John R. Heller, director of the National Cancer Institute said.

The data further indicate that the death rate from cancer is now definitely higher for men than for women in the white population.

These findings from ten metropolitan areas studied by the Institute are reported in "Morbidity from Cancer in the United States—Variation in Incidence by Age, Sex, Race, Marital Status, and Geography," by Dr. Harold F. Dorn and Sidney Cutler. (See p. 108.)

Science News Letter, August 13, 1955

PUBLIC HEALTH

Ragweed Here to Stay

Eradication programs called failure. Research for more basic attack on hay fever needed. Immunizing shots best present treatment.

By JANE STAFFORD

► **RAGWEED**, the No. 1 enemy to millions and millions of hay fever sufferers, is here to stay.

The sneezing, sniffing, miserable victims of allergy to this plant's pollen might just as well reconcile themselves to that fact. Instead of working for ragweed eradication, they would do better to go to their doctors for the relief that can be given by immunizing shots.

The money spent on futile ragweed eradication programs would be better spent on basic research to find better treatment for hay fever and other allergies.

Ragweed, of course, could be eradicated. Modern herbicides, or weed-killing chemicals, could eradicate all the ragweed growing in the United States.

To do this, however, the eradication program would have to be nation-wide not just community or state wide.

The cost each year would be only a little more than the national debt.

The treatment with herbicides, or weed killers, would have to be repeated every year for 40 years, at the same annual cost. The reason for this is that ragweed seeds can live in the soil for 40 years.

At the end of the 40-year, staggeringly expensive program, ragweed would probably be eradicated from our land. So also, would all our food plants and perhaps even our trees.

Eradication Chances Low

This grim picture of the chances for success in beating hay fever by eradicating the ragweed plant came from the American Foundation for Allergic Diseases in New York.

The hundreds of thousands of dollars currently spent each year by cities, towns and villages for ragweed eradication "might just as well be thrown down the drain for all the good it will do hay fever victims," Foundation authorities state.

New York City has carried on a nine-year fight to eradicate ragweed. More than 29,000 man-days of labor and \$750,000 of public funds have been spent. The program is believed the most ambitious ever attempted. But pollen counts in New York now are just as high as ever, Foundation authorities find.

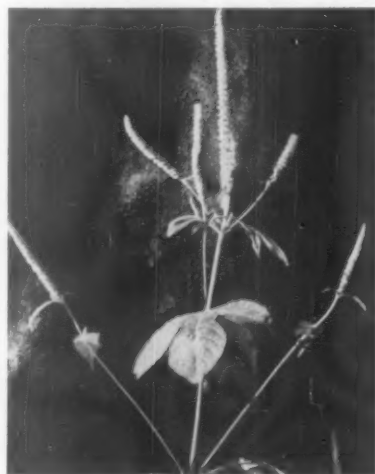
The reason is that at least half of New York City's ragweed pollen is generated outside the city and blown in on the wind.

One of the Foundation's scientists has

been making pollen counts for two years at a lightship off the New Jersey coast. The Atlantic Ocean area around this lightship is the same as the land area of greater New York. Pollen counts at the lightship station, the scientist finds, are as high as and sometimes higher than in New York.

The lightship study points up one of the big problems in trying to prevent hay fever by avoiding ragweed. The small light pollen grains can be blown great distances.

Ragweed, moreover, is found almost everywhere. Our modern weed killing chemicals are no match for the "thor-



ARCH-VILLAIN. From most hay-fever sufferers, this picture would get star billing in a rogue's gallery. The ragweed pollen causes their sneezing and other misery at this season.

oughly weed-saturated land in the urban, suburban and rural areas of our country," a Foundation statement concludes.

The only places where air contamination from ragweed pollen can be controlled are areas where the weeds are naturally absent or rare because soil and climate discourage their growth and where, in addition, there are natural barriers that prohibit the inflow of polluted air from adjacent weedy areas.

The barriers are broad, dense forests, deserts, and high mountain ranges. Prevailing winds from the ocean sometimes provide good one-sided protection. More often they do not, because high-floating clouds of pollen are often carried out to

sea and then blown back to the coast by onshore breezes.

The coastal region of Oregon and Washington, for example, had no ragweed until a few years ago. Some got in, presumably by accident, mixed with food plant seeds. Since the plant is not native to this coastal region, and since there are both ocean and high mountain barriers ragweed eradication would be practical there.

The same is true for southern Florida, where the plant is not native. Eradication would be practical.

Havens for Ragweed Victims

If you think about the barriers, you know one reason why certain regions of the country have long been havens for ragweed hay fever victims. These regions where the ragweed does not grow and little or no pollen can get across the barriers are the central Adirondacks, the extreme southern tip of Florida, the wooded areas of Maine, New Hampshire, northern Minnesota, extreme northern Michigan, the regions west of the Cascade Mountains in Oregon and Washington, and to some extent the desert regions and the forests of the Rocky Mountain and inter-mountain states.

Ragweed eradication is considered impractical but the allergy foundation offers this suggestion for individuals: If you suffer from ragweed-caused hay fever and have ragweed in your backyard, by all means pull it up. You will be helped somewhat, but your neighbor two doors or one block away will not, if he also is a ragweed hay fever victim.

Not nearly enough is known about hay fever and other allergic diseases that afflict more than 17,000,000 Americans. Less than \$250,000 has been spent in basic research on this problem in the last five years, the American Foundation for Allergic Diseases points out.

More needs to be known about the basic causes of hypersensitivity. With such knowledge, better methods of prevention and treatment might be worked out. Foundation officials hope to get from the public \$1,500,000 to finance search for this knowledge.

Meanwhile, for the hay fever sufferer this season, shots to desensitize, or immunize, him against the pollens are the best that can be offered. The shots can be taken now, during the season, and will give some help, though best results come from those given before the season starts.

Material for these shots has been improved in recent years, and there are chemicals in nose drops and pills that give temporary relief. These, however, should be taken with the advice of the doctor. Some help one sufferer but not another, and dosage, also, should be individually prescribed.

ASTRONAUTICS

Space Scientists' Courses

► **FUTURE SPACE SCIENTISTS** should start their college-level preparation now, since outer space flights will begin much sooner than is expected.

Darrell C. Romick, on the missile project staff of Goodyear Aircraft Corporation, Akron, Ohio, told the International Astronautical Federation at their sixth world-wide meeting in Copenhagen that flight into outer space comprises an entirely new scientific field of study and learning.

Space flight will become a major activity within the next ten years, he suggested, and now is the time to provide text books and set up specific courses in astronautical subjects at the college level.

The subjects Mr. Romick outlined for study have opposite numbers in the field of aeronautical engineering. Space flight, he said, "is now at a point corresponding to that of aeronautical science in the opening years of the 20th century." It is "very likely" to proceed more rapidly because of present-day "accelerating technical capabilities."

The most significant new astronautical science suggested for study by Mr. Romick is called astrodynamics, dealing with "the

dynamic flight behavior of space vehicles." It would include the performance kinetics and dynamics, stability and control of spacecraft, similar to aerodynamics in aeronautics.

There would also be a science of spacecraft propulsion, control systems, guidance, instrumentation, structures and design. Each of these would use techniques similar to those for aircraft, but would be specific for space vehicles.

Among operational sciences and skills, Mr. Romick said, would be astro-navigation, astro-communications, cosmology and astro-biology, or space medicine. Other unique areas for study would include spacecraft maintenance and repair and spacecraft piloting.

In Mr. Romick's opinion, the demand for more highly and specifically trained specialists in the astronautical sciences is increasing steadily.

"A rapidly initiated proper plan of organization is required," Mr. Romick said. This would be highly preferable to "the much slower evolutionary process" that would otherwise occur.

Science News Letter, August 13, 1955

Altitudes from 200 to 300 miles, Mr. Petersen said, would be probable for refueling operations.

For a nearly permanent orbit, he estimated 500 miles as the lower limit. Large manned satellites would take positions about 1,075 miles in space, he calculated.

Science News Letter, August 13, 1955

TECHNOLOGY

Earplug Made of Wax-Filled Plastic

► **AN EARPLUG** made of wax-filled soft plastic that conforms to the ear shape has been developed by Dr. J. Zwislocki of Harvard University.

People have found these earplugs sufficiently comfortable to sleep with, he says, and they cut down sound with an efficiency equal to or better than known earplugs.

When tested on 20 males and 25 females, the earplug fitted 90% of the persons. Although it has been made in only one size, its efficiency might be improved by a range of sizes, Dr. Zwislocki said in the *Journal of the Acoustical Society of America* (May).

Science News Letter, August 13, 1955

ASTRONAUTICS

Orbit for Manned Moon

► **A MANNED EARTH SATELLITE** would have to be 1,075 miles out in space to serve as a stepping-off place for interplanetary space ships, Norman V. Petersen has concluded.

Mr. Petersen, president of the American Astronautical Society and a guided missiles engineer at Sperry Gyroscope Co., Lake Success, N. Y., calculated the behavior and lifetimes of earth satellites in orbits at various altitudes.

He told the Sixth International Congress of the International Astronautical Federation meeting in Copenhagen that low-altitude orbits are useful only for short-period research studies, or refueling and payload

transfers. These would be, he said, "perhaps from 100 to 200 miles, or approximately the 90-minute orbit (167 miles)."

More permanent orbits, required for extended research, astronomical observations, weather studies and space stations for departure points of distant expeditions, exist at altitudes of 500 to 1,000 miles—or near the two-hour orbit (1,075 miles).

Velocities of 17,000 miles per hour or more will be attained by even the closest satellites, Mr. Petersen pointed out. The man-made moonlets will circle the earth many times every day, appearing to rise in the west and set in the east, reversing other sky phenomena.

Earth satellites that might be used for relaying communications and perhaps even television programs would require "altitudes considerably in excess of 1,000 miles" for a nearly stable orbit.

A 167-mile altitude, he found, "represents the 90-minute orbit and is perhaps a probable minimum altitude for the first instrumented satellite probes having useful lifetimes of one to 20 days."

The unmanned earth satellite the United States plans to launch during the International Geophysical Year is expected to have an orbit from 200 to 300 miles above the earth's surface and to circle the world about once every 90 minutes. (See SNL, Aug. 6, p. 85.)

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADAPTIVE HUMAN FERTILITY—Paul S. Henshaw—McGraw-Hill, 322 p., illus., \$5.50. A contribution toward solution of the problem of man's increasing numbers in relation to his needs.

ADVENTURING WITH BEEBE—Selections from the writings of William Beebe—Duell, Sloan and Pearce, and Little, Brown, 283 p., illus., \$4.50. These accounts cover more than 40 years and range from Bermuda to British Guiana and the Pearl Islands, from the tops of lofty jungle trees to a half mile beneath the sea.

BRAZING MANUAL—Committee on Brazing and Soldering, American Welding Society—Reinhold, 193 p., illus., \$4.75. Not only clarifying terminology, but describing step-by-step basic processes.

A CHILD'S BOOK OF WILD BIRDS—Alexander Seidel and Dean Amadon—Maxton, 30 p., illus., 59 cents. This beautiful book has lovely illustrations, most in color, of the more exotic wild birds.

THE ESTIMATION OF HEALTH HAZARDS FROM AIR POLLUTION—W. C. L. Hemeon—Mellon Institute, 6 p., illus., paper, free upon request direct to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa. Fatalities in smogs, it is concluded, are due to irritation of the respiratory tract rather than to poisoning.

FROGS OF SOUTHEASTERN BRAZIL—Doris M. Cochran—Govt. Printing Office, U. S. National Museum Bulletin 206, 423 p., illus., paper, \$2.00. To the author's collection of over 1,500 specimens, mostly frogs, Dr. Adolpho Lutz generously added over 1,100.

THE ELEMENTS OF THE THEORY OF REAL FUNCTIONS: Being Notes of Lectures Delivered in the University of Cambridge—J. E. Littlewood—Dover, 3d ed., 71 p., cloth \$2.85, paper \$1.35. The subject matter is very abstract, but philosophy as such is excluded.

HIGHWAY TO THE NORTH—Frank Illingworth—Philosophical Library, 293 p., illus., \$7.50. An English writer tells of his visit to Britain's northernmost frontier.

AN INTRODUCTORY LABORATORY COURSE IN CHEMISTRY—Howard L. Ritter—Wiley, 119 p. plus data sheets, illus., paper, ring binder, \$2.50. Following closely the author's textbook.

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123 p., paper, \$1.75. Eighteen papers included in this publication describe a wide variety of materials, some of them quite new.

MANPOWER NEEDS IN HIGHWAY ENGINEERING—M. Earl Campbell and others—Highway Research Board, Bulletin 106, 30 p., illus., paper, 60 cents. Here, as in other branches of engineering, shortages are serious.

MANUAL OF ELEMENTARY PRACTICAL CHEMISTRY—R. D. Brown and T. A. O'Donnell—Melbourne University Press (Cambridge University Press), 185 p., illus., \$4.75. Intended for students taking first-year chemistry at the university level.

NOTES ON PERUVIAN COEREBOIDAE AND THRAUPIDAE—James Bond—Academy of Natural Sciences of Philadelphia, Proceedings, 21 p., paper, 65 cents.

THE REAL PROJECTIVE PLANE—H. S. M. Coxeter—Cambridge University Press, 2d ed., 226 p., \$4.75. An introductory university textbook on projective geometry.

WORLD DEVELOPMENT OF ATOMIC ENERGY: With Special Supplements on U. S. Bilateral Agreements and the U.N. Geneva Conference—Oliver Townsend and J. Robert Barlow, Eds.—Atomic Industrial Forum, 151 p., illus., paper, \$5.00. Answers to a questionnaire sent over the world in an attempt to obtain a complete survey of non-military uses.

Science News Letter, August 13, 1955

MEDICINE

Ulcer Vacation Time

► **STOMACH ULCER** sufferers should be having less trouble with their ulcers from now until the end of October, if they have just had their summer vacations.

The worst time for trouble with an ulcer is due at the end of a Friday afternoon in December.

The reason is to be found in the influence of rest and fatigue on ulcers, according to Dr. R. A. Jamieson of the University of Glasgow, Scotland. He has surveyed the number of cases of perforated peptic ulcers during the period 1944-1953. Although the figures are for Western Scotland, they bear out the theory that incidence of perforations is related to rest and fatigue, as follows:

1. Perforation, with its sudden, excruciating pain and danger of peritonitis and shock, is relatively uncommon in August, September and October and "unduly common" in December. In West Scotland, July is vacation month, and many do extra work in December to have extra money for Christmas.

2. Perforation is least common on Sundays and becomes progressively commoner throughout the week, reaching a maximum on Fridays.

3. Perforation is relatively uncommon during the night. Its incidence increases

NUTRITION

Potato Cooking Quality Predicted by Tests

► **HOUSEWIVES** MAY soon be choosing the best spuds for just the kind of cooking, from baking to mashing, they want to do from labels on the potato sack.

U.S. Department of Agriculture scientists have found that potato cooking qualities can be predicted by laboratory tests. Specific gravity, the weight of potatoes compared to the weight of the same volume of water, was found the simplest and most practical test of cooking quality.

Amounts of dry matter, alcohol insoluble solids and starch are also good indicators, they reported.

In the experiments, different varieties of potatoes, each grown in several localities and in different years, were boiled, mashed and baked to determine their cooking quality. Then raw potatoes were analyzed, and the findings were matched with how they turned out in the kitchen.

Eating qualities of the potatoes varied considerably, the scientists found. The same varieties of potatoes showed different ratings when grown in different localities, and the same kind of potatoes grown in different years showed marked variation in cooking characteristics.

Length of storage also affects eating quality. The longer the potatoes are stored, the less mealy and the more soggy they become.

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to a minor peak at the end of the morning, to a major peak at the end of the afternoon, and again to a minor peak in the late evening.

Dr. Jamieson reports in the *British Medical Journal* (July 23).

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ASTRONOMY

Bright Comet Spotted In Early Morning Sky

► **A BRIGHT COMET**, visible through good binoculars or a small telescope, has been discovered in the constellation of Orion, visible low in the southeast sky in the early morning.

The comet is seventh magnitude, too faint to be seen with the naked eye. It was first spotted on July 29 by the Japanese astronomer Honda of Imperial University's Kwasan Observatory, Kyoto, Harvard College Observatory has reported.

When discovered, the comet's position was four hours, 49.2 minutes in right ascension and minus 2 degrees, 33 minutes in declination. Its motion is plus two minutes, four seconds in right ascension and plus one degree, six seconds in declination.

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GENETICS

Gives Disease Resistance

► **BOMBARDMENT** BY nuclear particles can cause inheritable resistance to diseases in disease-prone plants.

Dr. Calvin F. Konzak, biologist with the Brookhaven National Laboratory, Upton, L.I., has induced resistance to oat rust in one oat variety by subjecting seeds to bombardment by neutrons, which are uncharged atomic particles, from the laboratory's reactor. The oat variety was previously very susceptible to the disease.

Another experiment, described by Dr. Howard J. Curtis of the Brookhaven Laboratory, indicated that resistance to both oat rust and oat blight can be caused by exposure of seeds to neutrons.

These are some first fruits of the Brookhaven Laboratory's program of research on the effects of neutron exposure on plant heredity.

Most all atomic radiation can lead to changes in the genetic arrangement of plants and animals. In the majority of cases, geneticists find that the changes are harmful rather than beneficial mutations. By subjecting large numbers of seeds to irradiation, then carefully watching for desirable mutations and discarding the harmful mutations, plant breeders have a

powerful tool in their search for better varieties of plants.

Experimental stations and universities from Florida to Alaska are working with the Brookhaven Laboratory on the project. The 42 cooperating centers send various kinds of seeds to Upton, where they are exposed to neutrons in the reactor.

After exposure, the seeds are returned to the home research centers where they are planted and the grown plants studied for genetic changes. Plants showing useful mutations are then checked over several generations to see if they have practical value in plant breeding.

Mutations arising from gamma and X-ray irradiation have also been studied, the laboratory reported. The physiological condition of the seeds is a controlling factor in mutations with radiation. Using neutrons, however, this factor is avoided and results are more uniform from large number of seeds.

This makes it appear that neutron exposure is two to four times as efficient in plant mutation studies as irradiation with gamma and X-rays, the laboratory said.

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PHYSIOLOGY

Too High for Humans

► A CAT may not hear the deep rumble of a passing truck or thunder as well as a man can, but the cat's hearing is much better when it comes to an insect's high-pitched squeak or a bird's chirp.

The cat's hearing span was measured by Drs. William D. Neff and Joseph E. Hind of the University of Chicago's Laboratories of Physiological Psychology and Otolaryngology. Results are reported in the *Journal of the Acoustical Society of America* (May).

For sound waves below 500 cycles per second, a cat's ears may not be as sensitive as man's. The lowest notes to which man is sensitive are actually felt rather than heard. A frequency of 20 per second sounds not like a tone, psychologists have found, but like a low fluttering sound. Notes too low to be heard are sometimes felt as vibrations on the body.

From 62.5 cycles per second to 2,000, the sensitivity of cats and men is much the same. For frequencies higher than 2,000, the cat begins to show its superiority.

Man hears his best between 2,000 and 4,000 cycles per second. Beyond 4,000, his sensitivity rapidly drops. The upper limit is reached at about 20,000 cycles per second, the frequency of the violin's highest notes.

A cat's hearing is best at about 8,000 cycles per second and its hearing is good up to 40,000 cycles per second. The upper limit is not reached until 60,000 cycles.

Previous experiments on cats' hearing

have explored only the range from 20 to 10,000 or 20,000 cycles per second, the psychologists making this study explain. Because of their findings, they recommend extending the range to 60,000 cycles.

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VETERINARY MEDICINE

Swine Disease Defies Experts

► A SWINE DISEASE that has spread into almost every section of the United States in the last ten years has the experts stumped.

Both cause and cure for infectious atrophic rhinitis in swine is unknown, Dr. B. T. Simms, chief of the Department of Agriculture's animal disease research section, said.

Farmers are now learning to live with the costly disease, which attacks facial bones, especially among young pigs, giving the animals a "dished-in" appearance. Pneumonia often follows in its wake, the American Veterinary Medical Association has reported.

Although not so destructive as diseases such as hog cholera, infectious atrophic rhinitis cuts the weight and growth of infected swine, often leading to expensive 20- to 30-day marketing delays.

No attempt has been made to control the

disease by quarantine and no eradication projects are under way, Dr. Simms said. Preliminary experiments at the Agricultural Research Center, Beltsville, Md., indicated control might be effected by raising young pigs free from exposure and keeping them on clean ground.

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BIOCHEMISTRY

Biochemical Test For Mental Illness

► A BIOCHEMICAL TEST for diagnosing the common mental disease, schizophrenia, has been developed by two Chicago physicians.

The test, which involves the effect of insulin on blood samples of the patients, was reported by Drs. Ivan Boszormenyi-Nagy and Francis J. Gerty of the College of Medicine of the University of Illinois in the *American Journal of Psychiatry* (July).

After adding a small amount of insulin, the blood is centrifuged to remove white cells. Ice water is added to the red cells to break down the cell walls. Then the tendency of the resulting red-cell cream to form enzymes is measured.

The test gives different results with the blood of schizophrenic patients and with the blood of student nurses used for comparison. Schizophrenic blood is deficient in enzyme formation. Blood of patients with mental diseases other than schizophrenia gives normal results.

There was some tendency, however, for normal results to be obtained on the blood of schizophrenic patients in whom the disease had a slow, insidious development instead of the sudden onset typical of simple schizophrenia.

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MEDICINE

Eating "for Two"

► **EXPECTANT MOTHERS** should be under the care of a doctor from the time they first suspect they are going to have a baby. The diet they follow should be prescribed for each by the doctor who has examined the woman and knows her particular needs.

Probably the doctor will tell the expectant mother that her diet should contain plenty of good protein, such as meat, eggs, milk, cheese, poultry and fish. The need for enough protein to help her carry her baby to term has been widely recognized.

Part of this protein, it is believed, is needed to build hormones, that is, gland chemicals, essential for carrying and delivering a healthy baby. In recent studies reported in *Nutrition Reviews* (May), it was found that, among rats on diets with reduced protein content, 30% failed to produce normal offspring and 17% of the young were born dead.

The possibility that these resulted from

failure of the rats to produce the normal pregnancy hormones prompted studies in which hormones and vitamins were given.

Protein-free diets were given with twice the amount of vitamin supplement that had been added to the diets of the previous experiment. Injection of the hormones estrone or progesterone, separately, increased the number of successful pregnancies.

The average number of live offspring per rat was only six, however, in comparison to a normal of eight or nine, although giving both estrone and progesterone maintained live offspring in 100% of the animals and the number of living young per rat was nearly normal.

This apparent failure in production of essential hormones when diets are inadequate in protein has been observed by numerous investigators, strengthening the basis for recommendation of adequate supplies of protein during pregnancy.

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The Whooping Crane

► **THE BREEDING GROUND** of the world's last flock of whooping cranes has at last been found. And nature lovers are delighted that the cranes have chosen one of the world's wildest, most inaccessible areas to make their last stand for survival.

The whoopers' summer quarters, discovered May 18, lie in the northeast corner of the world's largest national park, Wood Buffalo Park, in Canada's Northwest Territory. Their nests are in a country of numberless lakes, ponds and rivers north of the 16th parallel, in the same latitude as the Yukon.

The chances of hunters and other persons disturbing the whoopers in their breeding ground is practically non-existent, so remote is the area. Even the Canadian government naturalists who went to study the giant birds had to make three tries by canoe, airplane and helicopter before they could break through to the cranes.

At present, there are known to be 21 adult whooping cranes, four nestlings, and—when last seen—one unhatched egg.

The whoopers, the tallest birds in North America, will begin the southward flight to their winter quarters on the Texas coast late in September. The annual migration will be over by early November.

The migration route of the last of the whooping crane flock is well known. From their summer wilderness hideaway, they cross over the farmlands of Saskatchewan and down across the Dakotas, the sandbars of Nebraska's Platte River, the fields of Kansas and on through Oklahoma to Texas.

These giant birds are at their greatest peril when they are making the migration, for they are exposed to their greatest enemy—the hunter. Lovers of nature along the whooping cranes' migratory route should learn to identify this handsome bird and tell their hunting friends about it. Perhaps their words may keep a trigger from being squeezed—and thereby save a whooping crane.

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ARCHAEOLOGY

Find "Stale" Material

► **LESS THAN 20 miles** from Las Vegas, where a comedian was fired from his high-salaried engagement because his patter was "not fresh," archaeologists have restudied campfires and toasted bones of extinct animals that have not been "fresh" for more than 20,000 years.

Radiocarbon dating showed the ash-beds of this earliest American are more than 23,800 years old.

The ancient campfire was originally discovered by Fenley Hunter of the American Museum of Natural History in 1933, but for many years the ash sample lay mislaid and all but forgotten in a Southwest Museum storage room. It was only recently given its radiocarbon date.

Now a party from the Southwest Museum, led by M. R. Harrington, has returned to re-study the site and look for

further evidence of how the earliest known American lived. Of particular interest, they found a fire-pit where a camel had been cooked and eaten. His bones, split and broken, some burned, were found mixed with charcoal of a man-made fire.

One of the party, Miss Ruth D. Simpson, assistant curator of the museum, found a large part of the disarticulated skeleton of a mammoth, an extinct elephant, including one great tusk more than seven feet long. About 20 inches from the skull on the same level was a small charcoal bed indicating a contemporary fire, probably of human origin.

Commonest of all the meats on the early American cookfire was that of the large American camel. Not used as much were the long-horned bison, a deer, two species of American horse and the mammoth. All these animals are characteristic of the Pleistocene period, or Ice Age, and all have long been extinct.

It is not known how our first ancestor killed these huge beasts for his food, but study of the bones showed that the animals were generally very young or aged when they were killed. Some crude chipped stone choppers or hand-axes and scrapers were found and one sharp obsidian flake.

Science News Letter, August 13, 1955

More than 100 kinds of *mosquitoes* are found in the United States.

A "moving sidewalk" that can go around corners and carry passengers in two directions has been developed.

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CHESS

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✿ **BOATER'S BLANKET**, made of light but warm acrylic fiber backed with plastic, sheds water readily and is wind-proof, mothproof and fire resistant. Excellent for use when sleeping on deck or in an open cockpit, or for camping or other outdoor activities, the blanket is less bulky than comparable wool coverings and stows in a smaller space.

Science News Letter, August 13, 1955

✿ **AIR SPEED INDICATOR** and insect deflector combination, a new safety device that attaches to the front of a car hood, permits a driver to check on his speed without taking his eyes from the road. The transparent plastic speedometer has large dial numbers, readable day or night under most conditions, and has no mechanical parts to get out of order.

Science News Letter, August 13, 1955

✿ **TEST TAPES** and records and a level indicator for use with them will detect rumble, hum, flutter and "wow" in phonographs and tape recorders. A precise method of determining the overall performance of audio systems, the test products are supplied with full information.

Science News Letter, August 13, 1955

✿ **CLOTHESPIN-LESS CLOTHESLINE** holds washed items firmly between two plastic-coated steel wires, tightly twisted



about each other, as shown in the photograph. A wheel-like device, with a revolving center through which the steel strands are threaded, is run along the clothesline to spread the strands so that items may be attached or removed.

Science News Letter, August 13, 1955

✿ **STEREOPHONIC MUSIC SYSTEM** plays two separately recorded sound tracks, both recorded on the same tape, through

ENGINEERING

Tiny Radiation Indicator Detects Fast Neutrons

➤ **FAST NEUTRONS**, the most penetrating of all atomic radiations, can be detected with an inch-long radiation indicator developed at the University of California at Los Angeles Atomic Energy Project.

Devised by Dr. Benedict Cassen, the detector is a minute wafer of germanium, a transistor, encased in a plastic capsule about an inch long.

Neutrons have no electrical charge and are, therefore, difficult to detect. They are indicated with the new device by a permanent change in the germanium crystal's electrical conductivity resulting from neutron penetration.

The electrical changes are detected by chilling the germanium crystal, then measuring its resistance.

The neutron detector may be useful in monitoring neutron "leaks" in shielding around atomic power reactors, or in detecting neutron penetration of bomb shelters. It can also be useful in research on tissue penetration by neutrons. The minute germanium wafer can be inserted at various depths in experimental animals to measure penetration.

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separate amplifier-loudspeaker systems. Music originating from the left side of the orchestra is reproduced through the left-hand speaker, music from the right side is reproduced through the right. Conventional tapes may also be played on the system, but without stereophonic effect.

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✿ **ROTARY SANDER** has a unique circular ring that securely holds the abrasive discs on the sander, without using cement, but permits changing the discs in seconds. The clamp-on ring design eliminates sharp sandpaper edges that mar work and cut fingers, and takes full advantage of the new sand-screen abrasives, those with grit on both sides.

Science News Letter, August 13, 1955

✿ **ALUMINUM PHOTOPRINTS**, reminiscent of the old tintypes, can be made by the amateur photographer using pre-sensitized aluminum sheets in the same manner as regular printing paper. The aluminum photo-plates can then be worked into coasters, ash trays or similar articles.

Science News Letter, August 13, 1955

✿ **DRIP COLLAR** saves floors and carpets from paint dripping down the side of the paint can. Made of plastic, the reusable collar fits tightly onto the open top of a quart can. When paint brushes are wiped on the inner rim of the collar, the paint drains through slots in the rim section back into the can.

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ENTOMOLOGY

Caterpillar Rivals Moth By Shredding Fabrics

➤ **IF YOU LIVE** in the West or South, watch out for a new fabric-shredding caterpillar that makes its home in fan palms, warns Roy J. Pence entomologist of the University of California at Los Angeles.

The pink, smooth-bodied caterpillars usually feed on fan palm blossoms and spin their cocoons in the fibrous growth found matted at the base of the fronds. When they multiply unhindered, however, they are apt to invade the home, seeking material from which to spin their cocoons. They may shred clothes, drapes, upholstered furniture or expensive rugs.

Control of the caterpillar by insecticides is often difficult, due to the extreme height of many of the trees they infest, Mr. Pence says. Banding the trees may prevent them from crawling down the trunks, but the slightest breeze may cause them to fall.

The best control method is to have a "palm skinner" prune out infested areas, and to treat adjacent areas with DDT.

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Questions

ASTRONAUTICS—With what does astrodynamics deal? p. 107.

□ □ □

BIOCHEMISTRY—What is the first product made by plants in the photosynthetic cycle? p. 101.

□ □ □

ENGINEERING—What is the polytonic coder? p. 102.

□ □ □

MEDICINE—When are stomach ulcers most troublesome? p. 108.

□ □ □

PUBLIC HEALTH—Where are ragweed havens found? p. 106.

□ □ □

RADIO ASTRONOMY—How are radio "stars" located? p. 104.

□ □ □

PHOTOGRAPHS: Cover, Firestone Tire and Rubber Company; p. 99, Argonne National Laboratory; p. 101, Melvin Calvin; p. 102, U. S. Department of Agriculture; p. 103, Los Alamos Scientific Laboratory; p. 106, Fremont Davis; p. 112, Eastman Chemical Products, Inc.

Do You Know?

Today's automobiles carry as many as 13 electric motors.

Annual per capita consumption of paper in the United States is 400 pounds.

Cattle sometimes lose weight because mosquitoes drive them from lush pastures to barren hillsides.

The flat shell of India's window oyster is so translucent it can be used as window glass.

Cotton acreage in cultivation in the United States is the smallest in over 70 years, 14% less than last year, and not much over a third of the area typically planted in the late 1920's.

A disease that affects the entire upper respiratory tract of cattle, sometimes called "red nose," has been increasing steadily since it was first recognized in feeding cattle in Colorado in 1950.

More than 25% of the people who die from tuberculosis come to the attention of health authorities for the first time when death occurs.

Ordinary stop-and-go driving by the average motorist produces more harmful engine deposits than the heavy duty operation of large trucks on mountainous roads.

Bird raisers can brighten up the plumage of flamingos by feeding them on ground up shellfish in addition to their usual diet of grass pellets, millet, rice and dried flies.

An oil filter will remove a pound or more of dirt and sludge from a car's oil during 5,000 miles of driving.

Science News Letter, August 13, 1955

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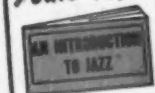
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